June 2007 Proposal to Revise the National Ambient Air Quality Standards for Ground-level Ozone

General Overview

Overview

- On June 20, 2007, EPA proposed revisions to the National Ambient Air Quality Standards (NAAQS) for ground-level ozone.
- The proposed revisions reflect new scientific evidence about ozone and its effects on people and the public welfare
- The proposed revisions would affect two types of ozone standards:
  - *Primary standards* to protect public health, including the health of "sensitive" populations such as people with asthma, children, and older adults
  - *Secondary standards* to protect public welfare and the environment, including sensitive vegetation and ecosystems
- EPA will hold four public hearings in Los Angeles and Philadelphia on August 30, and Houston and Chicago on September 5
- Agency will issue final rule by March 12, 2008
- For more information go to http://www.epa.gov/groundlevelozone

Ground-level Ozone is:

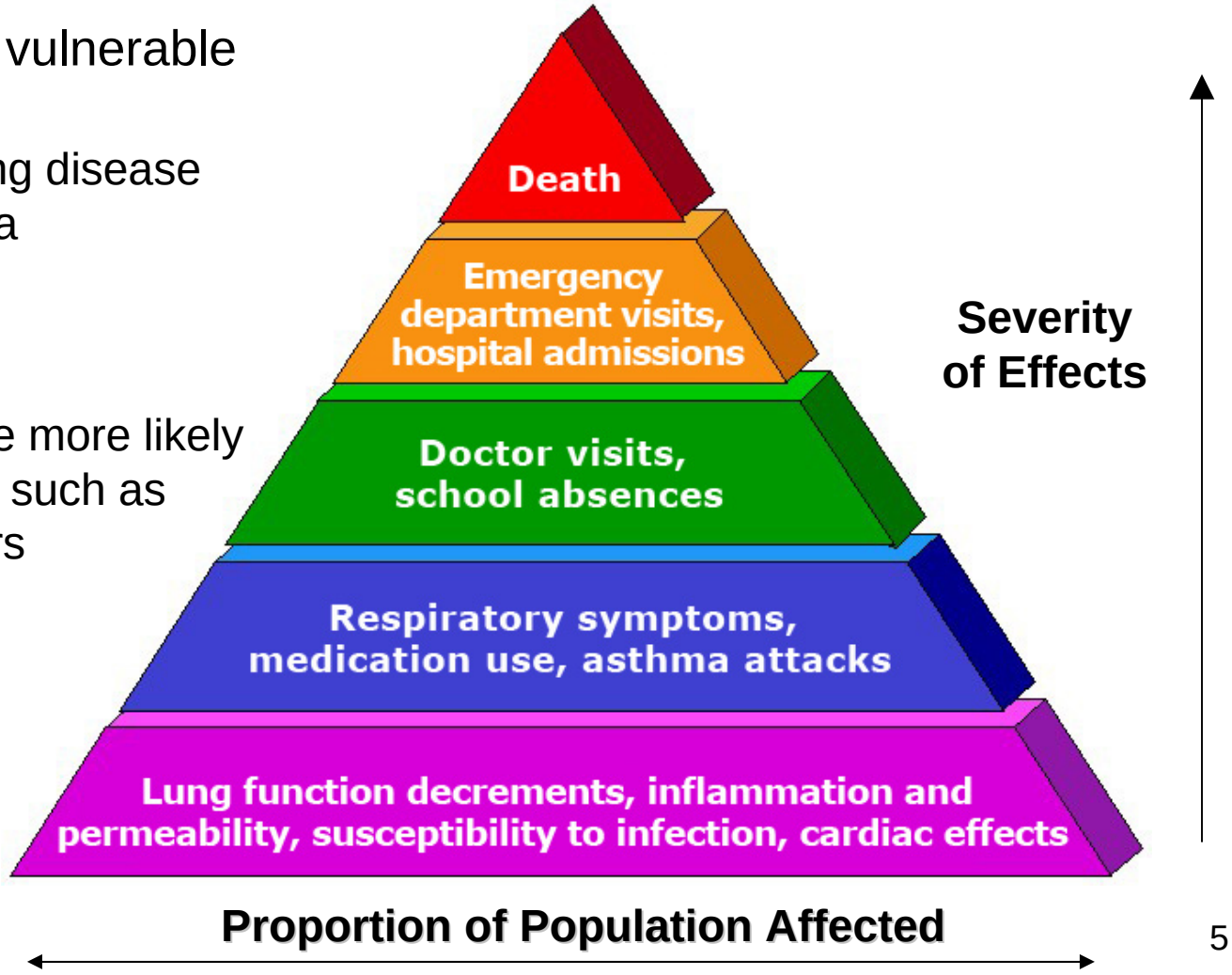
- **The primary component of smog**
- **Sometimes called "bad ozone" to distinguish it from "good ozone"**
  - Both types of ozone have the same chemical composition (O_3).
  - "Good ozone" occurs naturally in the upper portions of the earth's atmosphere and forms a layer that protects life on earth from the sun's harmful rays. "Bad" ozone is harmful to breathe.
- **Not emitted directly into the air, but forms when emissions of nitrogen oxides (NOx) and volatile organic compounds (VOCs) "cook" in the sun**
  - Emissions from industrial facilities, electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are the major man-made sources of NOx and VOCs.
- **Mainly a summertime pollutant, because sunlight and hot weather accelerate its formation**
- **Ozone levels can be high in both urban and rural areas, often due to transport of ozone, or the NOx and VOC emissions that form ozone.**

Ozone and Health

- Ozone can penetrate deep into the lungs and can:
  - Make it more difficult for people working or playing outside to breathe as deeply and vigorously as normal
  - Irritate the airways, causing: coughing, sore or scratchy throat, pain when taking a deep breath, shortness of breath
  - Increase asthma attacks and use of asthma medication
  - Inflame and damage the lining of the lung by injuring the cells that line the air spaces in the lung
  - Increase susceptibility to respiratory infection
  - Aggravate chronic lung diseases such as asthma, emphysema and bronchitis
- Repeated episodes of ozone-induced inflammation may cause permanent changes in the lung, leading to long-term health effects and a lower quality of life
- Ozone may continue to cause lung damage even when symptoms have disappeared

Ozone Health Impacts: "Pyramid of Effects"

- Susceptible and vulnerable groups include:
  - People with lung disease such as asthma
  - Children
  - Older adults
  - People who are more likely to be exposed, such as outdoor workers



Ozone and the Environment

- Ground-level ozone is absorbed by the leaves of plants, where it can:
  - Interfere with the ability of sensitive plants to produce and store food
    - This can lead to reduced growth, biomass production and/or yields.
  - Make sensitive plants more susceptible to certain diseases, insects, other pollutants, competition and harsh weather.
  - Reduce or change species diversity
    - This can lead to damage to ecosystems dependent on those species.
  - Visibly injure the leaves of plants, harming the appearance of vegetation in national parks, recreation areas and cities.

Regulating Ground-level Ozone Pollution

- The Clean Air Act requires EPA to set primary and secondary NAAQS for common air pollutants:
  - Ground-level ozone (smog)
  - Carbon monoxide
  - Nitrogen dioxide
  - Particulate matter
  - Lead
  - Sulfur dioxide
- The law requires EPA to review the scientific information and the standards for each pollutant ***every five years,*** and to obtain advice from the Clean Air Scientific Advisory Committee (CASAC) on each review
- Schedule for current ozone review:
  - Proposed rule signed June 20, 2007*
  - Public comment Period: 90 days, July-September 2007
  - Public hearings to be held in late August or early September in Chicago, Houston, Los Angeles and Philadelphia
  - Final rule to be signed by March 12, 2008*

(* Dates for proposal and final rules were established under a consent agreement)

EPA's Current Ozone Standards

- Current standards were set in 1997 (most recent revision)
- Primary (health-based) and secondary (welfare-based) standards are both 0.08 parts per million (ppm), with an 8-hour averaging time.
  - Because of rounding, these standards are effectively 0.084 ppm
  - EPA, states and tribes collect data about ozone levels from air pollution monitors. It takes three consecutive years of data to determine if an area is meeting (attaining) the standards
  - An area attains the current standards if: the three-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration measured at each monitor does not exceed 0.084 ppm

New Health Evidence in this Review

- Clinical studies show evidence of adverse respiratory responses in healthy adults from exposure to ozone at a level of 0.080 parts per million (ppm); very limited new evidence at 0.060 ppm
- Large number of new epidemiological studies, including new multi-city studies, strengthen EPA's confidence in the links between ozone exposure and health effects. New studies link ozone exposure to important new health effects, including mortality, increased asthma medication use, school absenteeism, and cardiac-related effects
  - Studies report effects at ozone levels well below the current standard
- Studies of people with asthma indicate that they experience larger and more serious responses to ozone that take longer to resolve

EPA's Human Health Exposure and Risk Assessments

- Estimated the magnitude of the public health risk from ozone and the extent to which alternative ozone standards might reduce adverse health effects (i.e., increased respiratory symptoms, increased hospital admissions, and possibly mortality)
- Focused on 12 urban areas:
  - Atlanta, Boston, Chicago, Cleveland, Detroit, Houston, Los Angeles, New York City, Philadelphia, Sacramento, St. Louis, Washington D.C.
- Exposure/risk assessments do not capture national-scale public health impacts or quantify the full range of ozone-related adverse health effects
- Results indicate no sharp breakpoint: gradual reductions in exposure and risk under alternative standards

Proposed Revisions to Primary Ozone Standard

- Current science shows that the current 8-hour ozone standard (effectively 0.084 ppm) is not adequate to protect the public health. EPA proposes that the standard should be revised to reflect the new scientific evidence about ozone and its effects on public health and the environment
- EPA proposes that a standard set within the range of 0.070 to 0.075 ppm would be requisite to protect public health with an adequate margin of safety
- The Agency is requesting comment on a range of alternative levels for the standard, down to 0.060 ppm and up to the level of the current standard
- EPA also proposes to specify the level of the primary standard to the nearest thousandth ppm (also referred to as the “third decimal place”)
    - Current monitoring technology can measure ozone at these precise levels.

Proposed Revisions to Primary Ozone Standard (cont.)

- EPA proposes that a standard set within the range of 0.070 to 0.075 ppm would provide appropriate protection against the variety of health effects associated with exposure to ozone
  - The Agency proposes that a standard level below 0.070 ppm would not be appropriate, because the evidence linking ozone exposure to specific health effects becomes increasingly uncertain at lower levels of exposure
  - EPA proposes that a standard level above 0.075 ppm would not be appropriate because of:
    - The strong body of clinical evidence of adverse health effects in healthy people at exposure levels of 0.080 ppm,
    - The substantial body of clinical and epidemiological evidence that people with asthma are likely to experience larger and more serious effects than healthy people, and
    - Evidence of the existence and magnitude of public health risk above 0.075 ppm

Welfare Effects Evidence: Vegetation

- Ozone affects plants differently than it affects humans. New studies indicate that the current 8-hour ozone standard may not be suitable to protect vegetation (crops and trees)
  - Plants respond to cumulative exposures to ozone, meaning the adverse effects build over repeated exposures, throughout the growing season
  - Plant growth tends to be most vigorous during periods of high temperature and high light—the same conditions that promote the formation of ozone
- Recent field-based studies provide additional evidence that growth and yield effects are related to cumulative impacts of ozone on vegetation during the growing season
- Ozone effects on sensitive tree species include loss of vigor, loss of competitive advantage and susceptibility to disease. This could lead to loss of plant diversity which could change the types of plants in an ecosystem

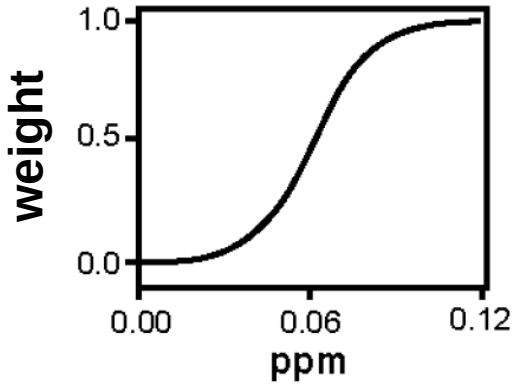
Proposed Revisions to Secondary Ozone Standard

- EPA is proposing two alternatives for the secondary ozone standard:
  - A new **cumulative, seasonal standard**, or
  - A standard identical to the proposed primary standard
- The proposed new seasonal standard is known as "W126"
  - W126 is a cumulative index form that weights and sums hourly measurements over a given period of time
  - EPA is proposing both a daily and seasonal time period over which to cumulate the weighted hourly measurements during the ozone season:
    - A 12-hour daily period
    - And a seasonal period consisting of the three months with the maximum W126 index value.
  - EPA is proposing to set this standard within a range of 7 to 21 ppm-hrs.
  - EPA is requesting comment on: whether the W126 standard should be calculated annually or averaged over three years

Understanding the W126 Secondary Standard Alternative

Steps in calculating W126 value for a particular site:

1. Measure hourly ozone (O_3) concentrations for each hour within the 12 hour daylight period (8am-8pm).
2. Assign a weight to each hourly value based on concentration: lower concentrations receive less weight than higher concentrations.
3. Sum the 12 weighted hourly values to calculate a daily W126 value.
4. Repeat steps 1-3 for each day within the ozone season and then sum the daily values to calculate the monthly W126 value.
5. Identify the consecutive 3-month period whose monthly W126 values produce the highest total.
6. This total becomes the seasonal W126 for this site.



Example of weighting over 5-hour period:

Hourly O_3 (ppm)	Weight	W126 (ppm-hrs)
0.03	0.01	0.00
0.05	0.11	0.01
0.06	0.30	0.02
0.08	0.84	0.07
0.10	1.0	0.10
	SUM:	0.20

Daily value =
Sum of values over 12 daylight hours

Example Timeline if Ozone NAAQS are Revised

Milestone	Date
Signature—Final Rule	March 2008
Effective Day of Rule **(60 days following publication in Federal Register)**	Approximately June 2008
State Designation Recommendations to EPA	June 2009 (based on 2006-2008 monitoring data)
Final Designations Signature	Approximately June 2010
Effective Date of Designations	Approximately 2010
SIPs Due	Approximately 2013
Attainment Dates	2013-2030 depending on severity of problem